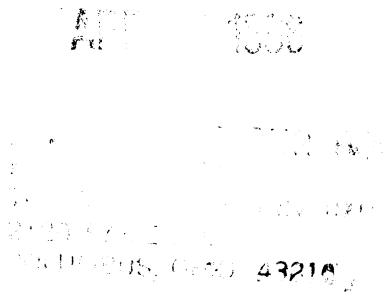
Economic Development Programs and Firm Self-Selection



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I. Background

Tax incentives are widely used by states and communities to attract new and relocating businesses and to assist existing firms undertake expansions. There are many opinions on the usefulness and effects of incentive-based economic development strategies and on the importance firms place on the local tax climate (and incentives) as a location decision factor. Many studies written prior to 1985 report that taxes (and tax incentives) have little, or no, effect on firm location decisions (Due 1961, Wasylenko 1981). Some more recent studies suggest a positive relationship exists between low taxes and firm location, especially at an intraregional level (Bartik 1985, Friedman et al., 1992).

The interactions between communities demanding and firms supplying jobs can be viewed as a market in which rival locations offer large incentive packages to attract new firms and jobs (Blair et al., 1984, Gabe 1996). In this market there is competition between communities, and communities and firms negotiating over incentives engage in strategic behavior (Wolkoff 1992, Oechssler 1994, Wohlgemuth and Kilkenny 1996). Optimization models can be used to analyze the behavior of governments and firms in the incentive process.

Governments (and political officials) often seek to increase the number of jobs and stimulate growth in the local economy, which increases the tax base and may increase an official's probability of reelection. Communities may offer incentives to capture the perceived benefits from increased local jobs and industrialization. Firms (and firm managers) act to maximize profits or size by finding the optimal location for new production, or by expanding capacity at an existing facility. Firms may request incentives

to offset more profitable opportunities to locate or expand in other locations. When the objectives of a government and firm are satisfied, and sufficient benefits from added jobs are allocated between both parties, the firm undertakes a project with incentive assistance.

This paper develops models of government and firm behavior, and uses a logit model to predict a firm's probability of participating in a state-level tax incentive program. Our main objective is to provide a conceptual foundation that is consistent with incentives requested by firms and offered by the state of Ohio. An objective of the empirical analysis is to determine the characteristics that influence a firm's choice to apply for and a state's choice to offer tax incentives. The analysis addresses the question: under what circumstances are business expansions, relocations or start ups likely to involve tax incentives? The conceptual and empirical frameworks provide insight into the underlying behavior of governments and firms in choosing to offer incentives and undertake projects with, and in other cases without, incentive assistance.

Our intent in this paper is not to evaluate whether tax incentives have a significant impact on employment growth and locational decisions. Although other studies have analyzed the relationship between taxes and firm location and growth, our findings are not meant to support or reject any hypotheses related to taxes and firm location. Rather, the paper focuses on the incentive process itself, and not on the success or failure of incentive projects. The conceptual foundation is admittedly too simple to explain all aspects of the incentive process. For example, there are political and institutional factors that enter into the incentive process. Although these factors could be built into the model, they are

ignored here to highlight the economic decisions motivated by underlying optimizing behavior.

To formalize the actions of governments and firms, we utilize the concepts of a community's willingness to pay for jobs and a firm's cost of job creation. Both measures are determined by characteristics of the firm (and jobs they are likely to create) and the community where the project will occur. For instance, a community's willingness to pay for new local jobs is likely based on current levels of unemployment and market conditions, and characteristics of the new jobs and industry. Likewise, a firm's cost of job creation in a particular location is determined by its proximity to markets, the quality of the local labor force, and firm and sectoral technological factors.

This paper looks at the relationships between projects that receive incentive assistance and attributes that are internal and external to the firm. Our findings suggest there is a negative relationship between a project's probability of receiving a tax incentive, and firm size and age. The probability of receiving tax assistance increases with project size, measured by promised new jobs. Average annual wages per worker in a county, the number of interstate miles in a county, and a county's environmental nonattainment status are negatively related to the probability of a project receiving a tax incentive. The county labor force size and the probability of receiving tax assistance are positively related.

The plan of this paper is as follows. Section II develops an underlying theoretical foundation that motivates the behavior of communities and firms in the incentive process. In section III, we discuss the empirical model and present results of the logit estimation.

The paper concludes with a discussion of limitations of the model and empirical framework.

II. Theoretical Foundation

The incentive process is described in this section in terms of underlying community surplus and firm profit optimization models.[1] Oechssler (1994), and Wohlgemuth and Kilkenny (1996) analyzed the incentive process with an interest in optimal community response to incentive requests, given imperfect information about a firm's need for tax assistance. These studies treat the firm's incentive request as a signal of the firm's opportunity to locate in an alternative location.

Oechssler (1994) motivates government behavior by community welfare maximization from tax revenues and jobs retained in the community (and possible political considerations). Wohlgemuth and Kilkenny (1996) assume that local officials maximize their probability of reelection through the provision of public goods, while maintaining horizontally equitable taxes across firms, subject to a government budget constraint. The objective of tax equity is motivated by local demands that all firms be treated equally in the receiving of tax incentives. Wohlgemuth and Kilkenny (1996) treat 'copy cat costs' as an important factor in a community's choice to offer a tax incentive to any particular firm.

II.a Government Behavior

In this paper, the government's choice to offer tax incentives is motivated by community surplus maximization. The surplus from any project is defined as the

community's willingness to pay for jobs from a particular firm in a given location, less any incentive that may be offered by the government.[2] The position and curvature of $\omega(.)$ with respect to L assume that promised, new jobs will be filled by residents with the highest social value of obtaining a job.

Maximize: $S = \omega(L; \Omega) - I$ (eq. 1)

$\omega'_L(L; \Omega) > 0 \qquad \omega''_L(L; \Omega) < 0$

$\omega(0; \Omega) \leq 0$

where, S = community's surplus from additional local jobs

$\omega(.)$ = community's willingness to pay for jobs

I = locational incentive

L = number of jobs promised by firm

Ω = firm and community characteristics

The community's underlying objective reveals implicit assumptions about government behavior related to the use of tax incentives. For example, governments may have a willingness to pay for certain jobs added to a local area. A community's willingness to pay for jobs is justified by the perceived benefits of increased industrialization and job creation in a community.[3] In the State of Ohio, a criteria for receiving a Job Creation Tax Credit is that the "project is economically sound and will benefit the people of Ohio by increasing opportunities for employment." The state's willingness to pay for jobs represents an attempt to capture benefits that accrue to Ohio residents from increased employment opportunities.

The restrictions imposed on the origin and curvature of $\omega(L; \Omega)$ imply that the average willingness to pay for jobs decreases as the size of the project increases.[4] For some projects, with $\omega(L; \Omega)$ less than zero, the government is unwilling to pay for jobs added to the community. In these cases, costs from additional congestion or environmental damage, or costs of extending local public goods and services outweigh any local benefits from additional jobs.[5] These projects are not worthy of tax incentives from the point of view of the community. More generally, any project that requires an incentive greater than the community's willingness to pay for jobs is unworthy of incentives. Another implication of the government's underlying objective function is the negative relationship between community surplus and incentive size. Other things equal, the community is better off attracting firms with the lowest possible incentive, or no incentive at all.

II.b Firm Behavior

Firm behavior is described in terms of the decision to allocate resources to a project that creates jobs in a specific location. The project may be a firm birth, expansion or relocation. The assumption that underlies firm behavior is that the firm will undertake a project if its expected profits are greater than the return from alternative activities. The firm chooses the most profitable activity from (1) pursuing a project in a baseline community, (2) pursuing a project in any other community, or (3) undertaking some alternative investment.

The firm's benefit from undertaking a project in any community is the increase in revenue from greater output produced by added labor and capital. Project costs are the payments to labor and capital added by the project. The benefits and costs to firms vary across locations according to differences in input costs, transportation costs and local markets. The opportunity cost of undertaking a project in any community is the firm's most profitable alternative activity. For example, if another community lowers the cost of labor through the provision of better public services without raising taxes, and all other things are equal, the opportunity cost of locating in the baseline community increases.

The firm chooses its optimal allocation of resources between the set of alternative activities and pursuing a project in the baseline community. After deciding to expand its production capacity, the firm chooses the optimal location to invest its capital and undertake the project. The added capital, combined with labor, increases the firm's output and profits. The firm undertakes a project in the baseline community if:

$$PY_0 - W_0L_0 - R_0K \geq PY_A - W_AL_A - R_AK \qquad \text{(eq. 2)}$$

where, $Y = f(L, K)$

subscript 0 = baseline location

subscript A = any alternative location

P = output price (same in both locations)

Y = output level (varies across locations 0 and A)

W = wage rate (varies across locations 0 and A)

L = labor added by firm (varies across locations 0 and A)

R = rental rate of capital (varies across locations 0 and A)

K = capital stock (same in both locations)

The size of the capital investment is determined by technological and industry-specific factors, and is assumed to be independent of the site chosen for the project. The firm chooses its optimal levels of output and labor, along with the location choice, based on the rental rate of capital, the wage rate and the output price in the baseline and alternative communities. In this manner, a firm chooses the site with the highest return to its capital, and creates jobs in that location.

In instances where the community would receive a surplus from jobs added by a firm, the government may offer tax incentives to entice the firm to undertake a project in the area. The firm treats the incentive as a benefit in addition to the profit from undertaking a project. If the expected profits from a project in an alternative site are greater than in the baseline location, a tax incentive may influence a firm's allocation of resources from the alternative to the baseline community.[6] It is unlikely, however, that an incentive could induce a firm to undertake a project that would have been otherwise unprofitable in terms of the increased revenues and costs. The incentive could play an important role in offsetting the firm's opportunity cost of locating in another community, and may be more important to firms if alternative locations offer incentives as well. The firm's decision rule when incentives are available in the community is to pursue the project if:

$$I \geq (PY_A - W_AL_A - R_AK) - (PY_0 - W_0L_0 - R_0K) \qquad \text{(eq. 3)}$$

Along with increasing the benefits of a project, the incentive process may also add a set of tangible and intangible transaction costs to the firm. These include information,

administrative, goodwill and intervention costs. The information cost includes efforts on the firm's behalf to learn about the incentive program. A firm that is uninformed about the program may have a prohibitively high cost of information and will never request an incentive. Firms also incur a tangible administrative cost when requesting tax incentives. This includes application costs and the expense of meeting with government officials to negotiate the size and terms of the incentive.[7]

The loss of community goodwill is an intangible cost that may arise in cases where the community's perception of the firm changes based on its request for a tax incentive. Residents in certain communities may view tax incentives as a form of corporate welfare. In these areas, requesting an incentive may decrease the level of goodwill a firm has in a community.[8] A second intangible cost of the incentive process is the possible increase in government awareness of, and intervention into, the firm's activities. An incentive request may require the firm to provide financial statements to the local government.[9] Also, after the incentive is awarded, the government may request information from the firm to monitor the success of the program.

The firm's optimal decision rule takes into account the transactions costs that are incurred in the incentive process. To undertake a project with tax assistance from the baseline community, the incentive must offset any negative differential in profits between the baseline and alternative communities, and cover the incentive transactions costs. In other words, the incentive must be greater than the firm's cost of job creation in the baseline community. The cost of job creation is determined by a set of characteristics that affect the project's profitability in a particular location *vis a vis* other investments. The

cost of job creation increases as transactions costs rise. Likewise, the cost of job creation increases with the number of jobs added by the firm. This is a result of decreasing returns from adding a variable input (labor) to a fixed input (capital). If it is more profitable to locate in the baseline community than any alternative site, the cost of job creation is less than zero (and the firm will not require an incentive to locate in the baseline community).

$$I \geq (PY_A - W_AL_A - R_AK) - (PY_0 - W_0L_0 - R_0K) + C \qquad \text{(eq. 4)}$$

$$I \geq g(L; \Theta)$$

$$g(L; \Theta) = (PY_A - W_AL_A - R_AK) - (PY_0 - W_0L_0 - R_0K) + C$$

$$g'_L(L; \Theta) > 0; \qquad g''_L(L; \Theta) > 0$$

where, $g(.)$ = firm's cost of job creation

Θ = firm and community characteristics

C = incentive transactions costs

II.c Incentive Outcomes

The underlying objectives of communities and firms motivate their actions during the incentive process. Three general outcomes are consistent with rational behavior by both agents. First, the model suggests that some firms will undertake projects in the baseline community without requesting an incentive. In some cases, these firms do not have an attractive alternative investment, which lowers the project's opportunity cost. Firms will also undertake projects without assistance if transactions costs are high.

Second, firms may request incentives and be denied assistance from the government. When this occurs, firms will either undertake the most profitable alternative

investment or complete the project in its original location. If the firm undertakes the project after being denied an incentive, the community infers that the incentive request was a bluff. If the firm undertakes an alternative investment, it signals that the return to capital is greater in the alternative location. In this case, the incentive would have allowed the firm to undertake the project locally.[10] Incentive requests denied by the government signal that the project would not have generated a surplus in the community or that the community leaders believe the firm is bluffing.

A third outcome consistent with the model is that some firms will request incentives and receive tax assistance. For this to occur, the project must provide benefits to the community and firm. The allocation of benefits between the community surplus and firm profits is determined by which agent has more power during the incentive process. If the community has bargaining power (and perfect information), the government will offer incentives at the level where the community's marginal willingness to pay for jobs equals the firm's marginal cost of job creation, which provides the maximum surplus.[11] The community does not provide incentives to firms that are able to undertake projects without tax assistance. If firms have power in the incentive process, they are likely to request the maximum incentive the community is willing to pay. This results in a zero community surplus.

It is not certain which agent has more power in the incentive process. The relative mobility of firms *vis a vis* communities and the keen competition between locations suggest that some firms have bargaining power. Furthermore, firms possess asymmetric information about whether they require an incentive to undertake a project. On the other

hand, the government has private knowledge of the community's benefit from new local jobs.[12] The government also has information about its future plans to monitor tax incentives, and the likelihood that is will ultimately grant or deny a firm's incentive request.

Regardless of which party holds more power in the incentive process, there are two criteria that must be met by any project receiving a tax incentive. First, the community must be willing to provide an incentive to the firm (meeting the nonnegative community surplus criteria). Second, the firm must be willing to undertake the project in return for the tax incentive (meeting the cost of job creation criteria). In summary, projects that receive incentives must meet both criteria. Projects fail to receive assistance because the community views the project as undesirable, and/or the cost of job creation is sufficiently large.

III Empirical Specification

Our underlying model of government and firm behavior suggests there is a set of firm and community characteristics that determine whether a project receives a tax incentive. The extent to which any project meets the community's willingness to pay and the firm's cost of job creation criteria is unobservable. We observe only whether a project receives a tax incentive, or whether the project occurs in the baseline region without incentive assistance.

The variable Z_i is an unobserved variable that indexes how closely a project meets the criteria for receiving a tax incentive. As suggested by the model, Z_i is related to a set

$(X = X_1,...,X_n)$ of firm and community characteristics. The variable Z_i^* is a critical value of Z_i that determines whether a project meets both criteria and receives an incentive. The variable Ψ_i is an observed variable that equals one if a project receives an incentive, and zero if the project occurs without tax assistance.

$$\Psi_i = 1, \quad \text{if } Z_i \geq Z_i^*$$

$$0, \quad \text{otherwise}$$

A logit model estimates the probability that a project receives incentive assistance, given characteristics of the firm and community.

$$\pi_i = \text{Prob}(\Psi_i = 1) = \{\exp(\beta X_i) / (1 + \exp(\beta X_i))\} \qquad \text{(eq. 5)}$$

where, π_i = project's probability of receiving a tax incentive

Ψ_i = indicator variable that equals 1 if project receives incentive, zero otherwise

X_i = a vector of firm and community characteristics

III.a Program Description and Data

A logit model is used to analyze the relationship between a firm's probability of receiving an incentive from Ohio's Job Creation Tax Credit program, and selected firm and community characteristics.[13] The program provides a corporate tax credit that is equal to a percentage of the income taxes withheld from workers holding jobs created by the project. Larger tax credits (per promised job) are typically offered to firms that promise a large number of jobs, high wages, that purchase intermediate goods from Ohio

firms, or locate in "distressed" areas (Wasylenko 1996). The total incentive size, however, is closely related to the number of jobs promised by the firm.

The data set consists of information regarding business establishments that announced major projects (as reported in *Site Selection* magazine) in Ohio between 1993 and 1995. It is comprised of firms announcing projects that, in principle, would be candidates for receiving tax incentives from the state. The firm level data was collected in the 1997 *Ohio State University Business Growth Survey*, a questionnaire sent to approximately 1,000 firms that planned expansions between 1993 and 1995. From this survey, there were 494 usable responses. *Site Selection* lists projects that promise an investment of $1 million or more, a square footage increase greater than 20,000, or 50 or more new jobs. The projects are generally in the manufacturing or distribution sectors, though some office, research and development, retail, and hotel establishments are included.

Of the 494 projects in the data set, 156 received a Job Creation Tax Credit in 1993, 1994 or 1995. Tax incentives are generally restricted to manufacturing, distribution, research and development, and other high technology firms. Some conditions for receiving a tax credit are that the project creates new jobs, the project is "economically sound" and benefits Ohio residents, and the recipient firm must declare that the incentive is a factor in the firm's decision to undertake the project. These conditions are consistent with the underlying model of state and firm behavior. If the project benefits Ohio residents, it is likely that the state government has a willingness to pay for the added jobs.

III.b Explanatory Variables

The variables expected to predict whether a project receives an incentive are the firm and community characteristics commonly used to explain firm growth and locational decisions. Other variables are chosen that may affect a community's willingness to pay for jobs or a firm's cost of job creation. The SIZE and AGE of a firm are likely to be correlated with its probability of receiving tax assistance. Young firms typically grow faster than older firms, and in most recent studies firm growth is negatively correlated with size (Evans 1987, Variyam and Kraybill 1992). Ohio's tax credit program is also believed to favor new and expanding firms (Wasylenko 1996). The higher levels of firm growth expected in young, small firms and the program's apparent bias toward small firms suggest that the firm age and size variables are negatively correlated with the probability of receiving an incentive.

The PROJECT size is the number of jobs the firm promises to create in the community. The model suggests that total community benefits increase while the marginal benefit decreases with each added job. Furthermore, the firm's cost of job creation increases with each promised job. Since the project size increases the community's benefit from new jobs and the firm's cost of job creation, this variable is expected to be positively correlated with the probability of receiving tax assistance.

The firm's RATE of employment change between 1990 and 1993 is expected to be negatively related to the probability of receiving an incentive. The rate of prior growth is the percentage change in establishment employment between 1990 and 1993. Growth between 1990 and 1993 without incentive assistance suggests that the firm's current

baseline location is (or at least was recently) profitable. On the other hand, if firm employment declined between 1990 and 1993, it is more likely that it would require an incentive to create jobs in the following period.

The firm's INDUSTRY (by two-digit SIC) and TYPE (headquarters, branch plant or single location) are included as control variables in the logit analysis. The industry dummy variables are expected to capture the impacts of wages and job characteristics that vary across sectors. Firm type is expected to account for the differences in employment change and location decisions between single-unit enterprises and businesses that are part of a multi-establishment firm. Branch plant establishments may be more "footloose" and therefore more likely to be offered incentives than single establishments that are presumably tied to a particular location.

Several community factors are expected to influence whether a project receives a tax incentive. County economic characteristics and market conditions in the project's location should affect the firm's cost of job creation. Also, given that the state's incentive program may have a bias toward financing projects in "distressed" areas, adverse local conditions should influence the government's willingness to pay for jobs in areas across the state.

County-level EDUCATION attainment is likely to be negatively correlated with the probability of receiving a tax incentive. A highly educated local work force should lower a firm's cost of job creation and allow it to undertake a project without incentive assistance. Likewise, a poorly educated work force is likely to exist in distressed

communities, which suggests the state's willingness to pay for jobs increases the lower the local level of educational attainment.

The county's DISTANCE from a metropolitan area and the miles of interstate HIGHWAY in the county are indicators of the firm's access to markets outside the community. Firms should have a lower cost of job creation in (or near) major markets or locations accessible to national markets via interstate highways. These firms are less likely therefore to request a tax incentive.

County per capita money WAGES and the county UNEMPLOYMENT rate are indicators of an area's level of economic well being. As the county unemployment rate increases, the state is assumed to be more willing to pay for new jobs added in the county. This increases a project's probability of receiving tax assistance in areas with high unemployment. On the other hand, a high unemployment rate may decrease a firm's cost of job creation in the county, if high levels of unemployment decrease the reservation wage of local residents. This lowers a project's chance of receiving an incentive. Thus, we have no prior expectation on direction of the relationship between unemployment and the probability of receiving an incentive. The relationship between county per capita wages and a project's probability of receiving a tax incentive is also ambiguous. Areas with high money wages are generally less willing to pay for projects that may increase congestion and the demands for public services, since local wages are already high without the additional employment opportunities.

The size of the county LABOR force is expected to positively impact the probability of a project receiving tax assistance.[14] The labor force size measures local

product and labor markets. As the labor force increases, the firm should have a larger pool of potential workers, which may decrease its cost of job creation. On the other hand, the state may have a greater willingness to pay for jobs added to more populated areas, if other variables such as unemployment are constant. These areas may have a greater political significance than more sparsely populated counties. Since a large county work force is correlated with greater representation in the state legislature (and the possibility of the project potentially benefiting more people), projects in these areas may have a greater probability of receiving tax assistance.

The environmental NONATTAINMENT status in each county is a dummy variable that indicates if local pollution levels exceed environmental standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead and particulate matter less than ten milacrons in diameter.[15] Firms that emit these pollutants into the air may be forced to adopt costly technologies to reduce discharge levels. Thus, polluting firms may have a high cost of job creation in areas that do not meet attainment criteria. Clean firms may require incentives to locate in heavily polluted areas because of negative externalities. If pollution is a disamenity to management in nonpolluting firms, incentives from the state may increase the desirability of a location that is close to nonattainment status *vis a vis* other sites. From the state's perspective, the willingness to pay for jobs may be greater in nonattainment counties because of the difficulty of attracting jobs without incentives. Considering the relative strength of these factors, the probability of receiving an incentive is expected to increase in counties that do not meet attainment status.

III.c Estimation Results

The following model is used to estimate the relationship between a project's probability of receiving a tax incentive and a vector of firm and community characteristics related to the project.

$$\pi_i = \{\exp(\beta X_i) \,/\, (1 + \exp(\beta X_i))\}$$

where, π_i = project's probability of receiving a tax incentive

$$\beta X_i = \beta_0 + \beta_1 AGE + \beta_2 PROJECT + \beta_3 SIZE + \beta_4 RATE + \beta_5 EDUCATION + \beta_6 WAGES + \beta_7 UNEMPLOYMENT + \beta_8 LABOR + \beta_9 DISTANCE + \beta_{10} HIGHWAY + \beta_{11} ATTAINMENT + \beta_{12,13} TYPE + \beta_{14,15,\ldots,30,31} INDUSTRY$$

Two sets of dummy variables control for the relationships between firm type and industry, and the probability of receiving tax assistance. Firm type dummy variables indicate if the project is undertaken by a branch plant of a multi-establishment firm, or the headquarters of a multi-establishment firm. The omitted group includes single-unit establishments and businesses that are not classified.[16] The industry variables control for sector-specific effects. The service (SIC 60-67, 70-97) sector is the omitted category in the set of industry dummy variables.

Descriptive statistics of the 494 projects announced in Ohio between 1993 and 1995 are shown in table 1. They indicate that 32 percent of the projects (156 in total) received tax incentives. The average age of a firm undertaking a project is 21 years old, and the average size in 1993 (before the project) is 282 workers. The average project promises to add 77 new jobs. Firms in various industries undertook projects. The

industrial machinery and equipment (SIC 35), rubber and plastic products (SIC 30), and fabricated metal products (SIC 34) sectors, however, accounted for over 30 percent of the projects included in this paper. Table 2 presents the results of the logit analysis. The firm and community characteristics in our model are significantly correlated with a project's probability of receiving a tax incentive. The likelihood ratio for the set of explanatory variables is significant at the 99.9 percentile (chi-square value of 67.41 with 31 degrees of freedom). The model correctly predicts the outcome (whether a project receives an incentive, or whether it occurs in the state without assistance) of 72 percent of the projects.

Firm age and size are negatively correlated with a project's probability of receiving a tax incentive. These results are consistent with the hypothesis that Ohio's tax incentive program favors small and young firms. At the margin, businesses that are 10 years older than the average establishment have a 2 percent lower probability of receiving tax assistance. Projects undertaken in establishments that have 100 more workers than the average are 1 percent less likely to receive a tax incentive. Thus, an establishment that began operations in 1955, with 600 employees at the beginning of 1993, has an almost 8 percent lower chance of receiving tax assistance to undertake an expansion project than the "average" establishment.[17]

The project size, in terms of promised new jobs, is positively related to the probability of receiving tax assistance. This is consistent with assumptions in the model that the state has a higher willingness to pay for large projects, and that a firm's cost of job creation increases with the number of promised jobs. The estimates suggest that, at the

margin, a project has an 8 percent greater probability of receiving tax assistance for every 100 promised jobs above the mean (77 jobs). Thus, a project promising 400 new jobs is approximately 25 percent more likely to receive assistance than a project that promises 75 new jobs.

The establishment's rate of employment change between 1990 and 1993 significantly decreases a project's probability of receiving a tax incentive. This confirms our expectation that the incentive program favors establishments that have a net decrease in employment size (a sign of establishment distress) in the years before requesting an incentive.

Several community characteristics are significantly correlated with the probability of a project receiving tax assistance. The annual wages per worker in a county, a county's number of interstate highway miles, and a county's nonattainment environmental status decrease a project's probability of receiving a tax incentive. The logit estimates suggest that for every $1,000 dollars (above the average of $10,278) in average annual county wages per worker, a project is 2.5 percent less likely to receive an incentive. This is consistent with the incentive program's objective of providing assistance to firms that undertake projects in distressed areas.

The negative correlation between the number of interstate highway miles in a county and a project's probability of receiving tax assistance supports the hypothesis that greater market access decreases a firm's cost of job creation. The empirical estimates suggest that for every 10 additional miles of interstate highway in a county (above the average of 34), a project is 5 percent less likely to receive an incentive. The second

measure of market access, the county's distance from a major metropolitan area, is not significantly correlated with receiving an incentive. The relationship between environmental quality and the dependent variable suggests that projects in nonattainment counties are 11 percent less likely to receive tax assistance. This may suggest that, contrary to our expectations, the state has a lower willingness to pay for jobs added in nonattainment areas (or that a firm's cost of job creation is lower in nonattainment counties).

The logit estimates suggest a positive correlation exists between the size of the county labor force and a project's probability of receiving tax assistance. For every 100,000 workers in a county (above the mean of 150,000), a project's probability of receiving an incentive increases by 10 percent. This finding may confirm the notion that projects in areas with greater political representation have a higher probability of receiving tax assistance from the state.

The firm type and industry dummy variables are insignificant in explaining a project's probability of receiving an incentive. This suggests that incentives are not offered with more frequency to specific firm types or industries.[18]

IV. Conclusions and Model Limitations

The empirical results suggest that the incentive projects undertaken by Ohio establishments are, for the most part, consistent with our assumed underlying state and firm optimization models. Firm size and age (although not firm type or industry), and project size are significantly related to a project's probability of receiving a tax incentive.

Likewise, the findings generally support the notion that incentives are used to assist firms that locate or expand in distressed areas. As a whole, the empirical results support our hypotheses about firm and community characteristics that influence the probability a project will receive tax assistance.

There are, however, some weaknesses in the theoretical foundation and empirical model. First, the empirical model is unable to separate the effects of a community's willingness to pay for jobs and a firm's cost of job creation on a project's probability of receiving a tax incentive.[19] The community characteristics that affect a firm's cost of job creation in a county also influence the state's willingness to pay for jobs in that area. In some cases, a community characteristic (such as county educational attainment) increases both a firm's cost of job creation and the state's willingness to pay for jobs. Other factors, however, increase a firm's cost of job creation and decrease the community's willingness to pay for jobs. This leads to ambiguous expected relationships between community conditions and the probability of receiving tax assistance. For instance, other things being equal, high money wages in a county should increase a firm's cost of job creation and lower the state's willingness to pay for jobs. Our models of government and firm behavior, therefore, suggest opposing expected signs for the relationship between a project's probability of receiving an incentive and local money wages. Likewise, the conceptual framework does not suggest a clear-cut expected relationship between county labor force size and the probability of receiving an incentive. In these cases where the community and firm models suggest there are opposing forces, the result is an empirical question. The empirical result may imply, however, which factor (the community's

willingness to pay for jobs or the state's cost of job creation) is more important in the incentive process.[20]

A second weakness is that the model does not account for imperfect information that may arise in the incentive process, ignoring the problem of firms that request incentives but do not actually need them to undertake a project. If the assumption of perfect community information is valid, incentives are given only to projects with a positive cost of job creation. On the other hand, suppose that all firms are bluffing about their need for an incentive. In this extreme case, the empirical results may say more about a firm's ability to bluff than about its cost of job creation.

A third weakness is that our analysis is limited to projects that occur with tax incentives and projects that firms undertake without incentive assistance. We do not have information on firms that request incentives but are denied them by the state government. Some of the businesses that undertook projects without assistance likely requested incentives from the state and were turned down. Incorporating information on the decisions made by firms that are denied incentives would enable us to analyze a second component of the incentive process. The process could be expanded to capture the firm's decision to apply for an incentive, the state's decision to grant an incentive, and the firm's choice to undertake the project (with or without tax assistance). The model currently explains a firm's decision to apply for and accept, and a government's decision to offer, tax incentives.

Although these weaknesses are not insignificant, they do not detract from achieving the original objectives of this paper. We have laid out a conceptual foundation

that suggests incentive projects must meet a community's (or state's) nonnegative surplus criterion and a firm's cost of job creation. We find that tax incentive outcomes are largely consistent with our model and with economic development objectives in the state of Ohio. The empirical results are consistent with the notion that the incentive program favors young and small firms, that incentives are more frequently given to firms that promise a large number of jobs, and that incentives are used to stimulate expansions and firm location in depressed areas.

Table 1. Descriptive Statistics

Variable	Mean	Standard Deviation
Incentive	0.32	NA
Firm **Age**	21.32	26.15
Project Size	76.70	125.99
1993 Employment **Size**	281.89	958.21
1990 - 1993 **Rate** of Employment Change	0.29	0.59
Education	12.33	0.40
Average Annual **Wages**	10,278	3,739
County **Unemployment**	6.85	1.45
County **Labor** Force	150,000	211,000
Distance from Metropolitan area	15.44	15.52
Interstate **Highway** Mileage	34.46	36.74
Environmental **Nonattainment**	0.53	NA
Branch Plant	0.44	NA
Headquarters	0.12	NA
Single Unit Establishment	0.41	NA
Other Establishment	0.04	NA

Table 1. Descriptive Statistics (cont'd)

Industry	Percentage
Services (SIC 70-97)	2.83%
FIRE (SIC 60-67)	1.42%
Wholesale and Retail Trade (SIC 50-59)	9.11%
Transportation and Public Utilities (SIC 40-49)	1.42%
Food and Kindred Products (SIC 20)	4.45%
Textiles (SIC 22-23)	0.61%
Lumber, Wood, Furniture and Fixtures (SIC 24-25)	2.63%
Paper and Allied Products (SIC 26)	5.26%
Printing and Publishing (SIC 27)	2.83%
Chemicals and Petroleum Products (SIC 28-29)	4.25%
Rubber and Plastic Products (SIC 30)	11.54%
Leather Products (SIC 31)	0.41%
Stone, Clay and Glass Products (SIC 32)	4.45%
Primary Metal Industries (SIC 33)	6.28%
Fabricated Metal Products (SIC 34)	10.32%
Industrial Machinery and Equipment (SIC 35)	15.79%
Electronic Equipment (SIC 36)	5.87%
Transportation Equipment (SIC 37)	8.70%
Instruments and Related Products (SIC 38)	1.01%
Miscellaneous Manufacturing (SIC 39)	0.81%

Table 2. Logit Results

Variable	Coefficient	Asymptotic Standard Error	Asymptotic T-ratio	Marginal Effect[1]
Constant	-9.925	6.824	-1.454	-1.861
Firm **Age**	-0.012	0.005	-2.490**	-0.023 (10)
Project Size	0.004	0.001	3.582**	0.080 (100)
1993 Employment **Size**	-0.001	3.08E-04	-1.935*	-0.011 (100)
1990 - 1993 **Rate** of Employment Change	-0.327	0.194	-1.687*	-0.061
Education	0.854	0.536	1.593	0.160
Average Annual **Wages**	-1.34E-04	5.68E-05	-2.365**	-0.025 (1,000)
Unemployment	0.053	0.102	0.521	0.010
Labor Force	7.36E-06	1.61E-06	4.555**	0.001 (1,000)
Distance	0.006	0.010	0.588	0.001
Interstate **Highway** Mileage	-0.027	0.009	-3.170**	-0.051 (10)
Environmental **Nonattainment**	-0.627	0.315	-1.992*	-0.118
Branch Plant	0.194	0.235	0.825	0.036
Headquarters	0.100	0.364	0.274	0.019

Likelihood Ratio = 67.41** with 31 degrees of freedom

* Significant at 10% level
** Significant at 5% level

[1] Calculated at mean values

Table 2. Logit Results (cont'd)

Variable	Coefficient	Asymptotic Standard Error	Asymptotic T-ratio	Marginal Effect[1]
Wholesale and Retail Trade	-0.984	0.623	-1.579	-0.185
Transportation and Public Utilities	-0.146	0.941	-0.156	-0.027
Food and Kindred Products	-0.540	0.688	-0.785	-0.101
Textiles	-31.850	3.70E+06	-8.61E-06	-5.973
Lumber, Wood, Furniture and Fixtures	-1.595	1.049	-1.520	-0.299
Paper and Allied Products	0.589	0.646	0.913	0.111
Printing and Publishing	-0.114	0.782	-0.146	-0.021
Chemicals and Petroleum Products	-0.034	0.681	-0.049	-0.006
Rubber and Plastic Products	-0.018	0.569	-0.032	-0.003
Leather Products	0.380	1.721	0.221	0.071
Stone, Clay and Glass Products	-0.037	0.677	-0.055	-0.007
Primary Metal Industries	0.166	0.615	0.270	0.031
Fabricated Metal Products	-0.734	0.592	-1.241	-0.138
Industrial Machinery and Equipment	-0.543	0.552	-0.982	-0.102
Electronic Equipment	0.086	0.627	0.137	0.016
Transportation Equipment	-0.466	0.608	-0.767	-0.087
Instruments and Related Products	-0.302	1.101	-0.274	-0.057
Miscellaneous Manufacturing	0.841	1.133	0.742	0.158

[1] Calculated at mean values

Notes

1. The incentive process is loosely defined as the request for, offer of, or acceptance of a tax incentive by local communities and firms.

2. This general behavioral assumption is consistent with the incentive process outlined by Oechssler (1994), and Wohlgemuth and Kilkenny (1996). For example, a copy cat cost could be incorporated along with the incentive as a second component that decreases the community surplus.

3. Blair et al., (1984) motivate government behavior in the "market for jobs" on the bases of imperfect labor markets and economic stagnation in a region. In areas with some threshold level of unemployment, "(workers) should be willing to pay (for jobs) up to the costs - both monetary and psychic - of relocating for a comparable local job" (Blair et al., p.66). Benefits from local jobs may spread beyond affected workers to some property owners and, in the case where new jobs are in basic sectors, to other local businesses and residents through the multiplier process. Blair et al., also suggest the community's willingness to pay for jobs should vary across regions depending on their level of unemployment, public service and infrastructure capacity, and other factors.

4. This is consistent with the decreasing marginal social benefit from additional jobs assumed by Blair et al., (1984).

5. This notion expands Ihlanfeldt's (1995) first principle of offering effective and fair tax incentives. It states that "tax incentives should be accompanied by specific programs that seek to mitigate the unwanted side effects of economic growth." In our study, governments are assumed to have a negative willingness to pay for projects for which the unwanted side effects outweigh the external benefits. Thus, the underlying behavior predicted by the model is that tax incentives are not (or should not be) offered to firms undertaking projects with net negative external effects.

6. Even if the baseline community provides the most profitable location for the project, firms may benefit by receiving an incentive . This causes the information problem analyzed by Oechssler (1994), and Wohlgemuth and Kilkenny (1996). Firms without an attractive alternative investment (which translates into a low opportunity cost) have an incentive to seek tax assistance by acting as if they have a relocation opportunity. A weakness of our model is that it is impossible to distinguish whether a firm receiving an incentive actually requires it to undertake a project, or whether a community merely entertained its bluff.

7. The administrative costs are similar to lobbying costs defined by Oechssler (1994) as spending in a media campaign, taking government officials to dinner, etc.

8. A firm's reputation can be hurt even in cases when they request and are denied a tax incentive. If a firm undertakes a project locally after being denied an incentive, the

community learns that the incentive request was a bluff. This may adversely affect future relations between the community and firm.

9. In Oechssler's (1994) model, a policy instrument at the government's disposal is the decision whether to audit a firm that requests an incentive. An equilibrium in Oechssler's firm versus city subsidy game is to respond to a firm's subsidy lobby with a random strategy of offering an incentive and auditing the firm.

10. This assumes that a firm will not request an incentive less than its cost of job creation.

11. Offering incentives at this level assumes that projects are continuous in nature. In reality, jobs are added in discrete levels. Therefore, it is unlikely that any project will occur at the point where the marginal willingness to pay equals the marginal cost of job creation (which maximizes the community surplus) or where the incentive size equals the community's willingness to pay for jobs (which maximizes a firm's profit and provides a zero community surplus).

12. Though a formal economic analysis may not be conducted by community leaders, they inevitably undertake their own informal calculation about the political benefits of job creation.

13. The Ohio Job Tax Credit Program is explained by Wasylenko (1996) and Gabe (1996).

14. The community and firm models suggest the expected relationship between labor force size and the probability of receiving assistance is ambiguous. It is likely that a large labor force decreases a firm's cost of job creation. The relationship between the state's willingness to pay for jobs and the county labor force, on purely economic grounds, is uncertain. The county labor force, which is closely related to the area's population size, is probably more important politically at the state level. We expect that the political factors that increase the probability of receiving an incentive outweigh the economic factors that decrease a firm's cost of job creation.

15. McConnell and Schwab (1990) found no correlation between industrial location decisions and attainment or nonattainment status. They did find (taking into account the degree of environmental distress) that firms are less likely to locate in areas with heavy ozone pollution.

16. The survey instrument asked the respondent to choose the firm's type between (a) branch plant of a multi-establishment firm, (b) headquarters of a multi-establishment firm, (c) single unit establishment, or (d) other. The omitted group contains single unit establishments and the 4 percent of firms that are classified in the "other" category.

17. The economic significance of these results is uncertain. An establishment must be 50 years older, or 1,000 workers larger, than the average establishment to be 10 percent less likely to receive incentive assistance. Fifty years older than the average establishment represents two standard deviations from the mean. One thousand additional workers in 1993 is almost one standard deviation from mean values.

18. These results will be tested further in a future revision of this paper. Likelihood ratio tests would indicate whether the dummy variables are significant as a group.

19. In other words, the empirical model is unable to separate supply and demand factors that influence whether a project receives incentive assistance. Modeling the incentive process as a market for jobs (with incentive prices and job quantities) would enable us to isolate the effects of firm and community characteristics on incentive demand and supply.

20. This may be useful in determining which party holds more power in the incentive process.

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